City of Raleigh
Engineering
Services
Department

Stormwater Management

Ramblewood Drainage Improvement Project

Public Meeting - Jaycee Park
June 14, 2017

Introductions

City of Raleigh Staff

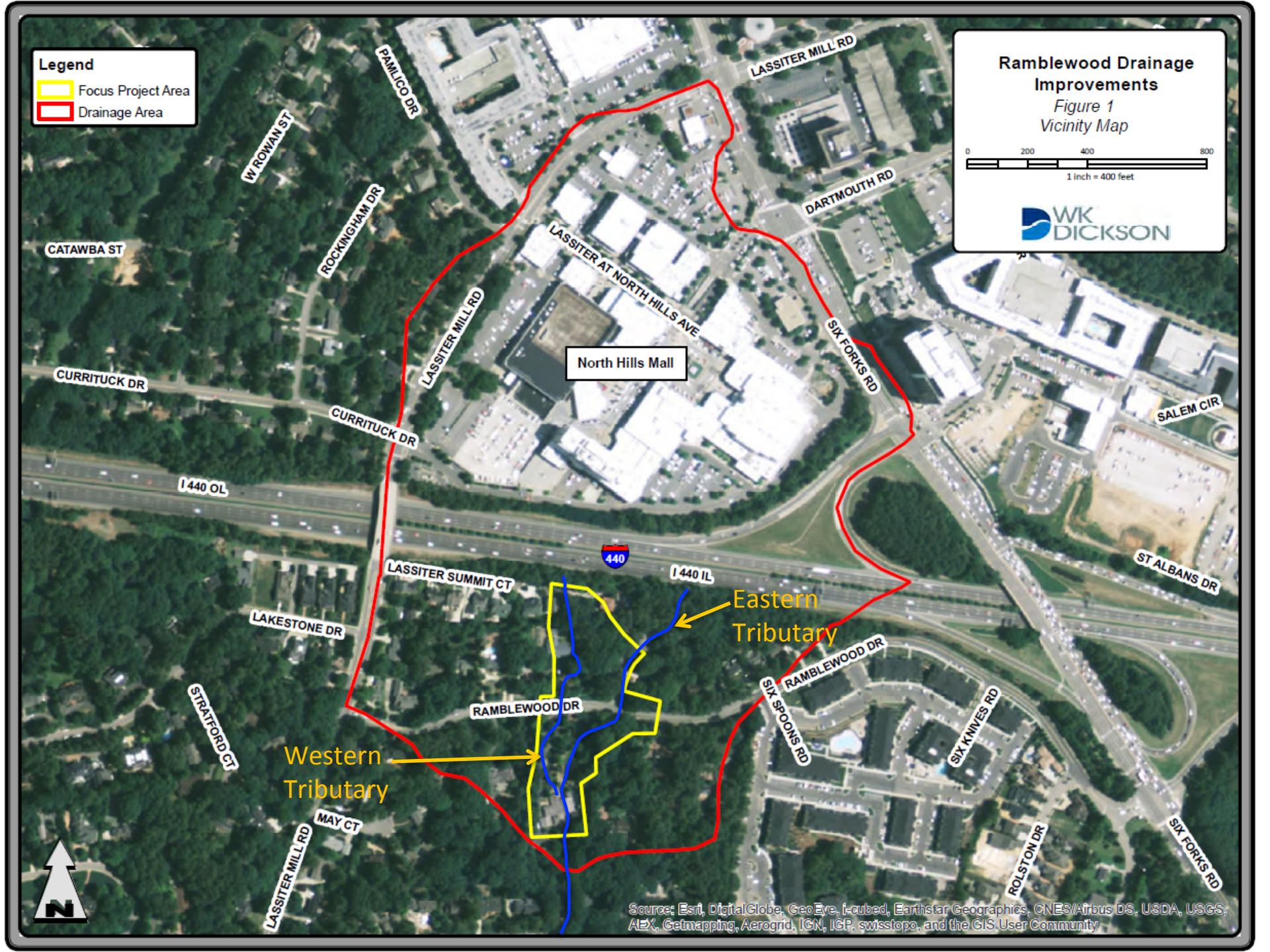
- David Kiker, PE, Engineering Services
- Veronica High, PE, Engineering Services
- Kristin Freeman, Engineering Services
- Sarah Gentry, Real Estate

WK Dickson Staff

- Scott Sigmon, PE
- Miranda Smalling, PE

Presentation Overview

- ✓ Study Area
- ✓ Existing Drainage Issues
- ✓ Project Goals
- ✓ Stormwater Modeling
- ✓ Recommended Drainage Improvements
- ✓ Permitting
- ✓ Construction Expectations and Challenges
- ✓ Proposed Schedule
- ✓ Easement Acquisition Process
- ✓ Questions & Answers
- ✓ Break Out Sessions


Legend
Focus Project Area
Drainage Area
Ramblewood Drainage Improvements
Figure 1
Vicinity Map
0 200 400 800
1 inch = 400 feet
WK DICKSON
PAMLICO DR
LASSITER MILL RD
W ROWAN ST
ROCKINGHAM DR
DARTMOUTH RD
CATAWBA ST
LASSITER AT NORTH HILLS AVE
LASSITER MILL RD
SIX FORKS RD
North Hills Mall
CURRITUCK DR
CURRITUCK DR
SALEM CIR
I 440 OL
440
I 440 IL
LASSITER SUMMIT CT
ST ALBANS DR
Eastern Tributary
LAKESTONE DR
RAMBLEWOOD DR
RAMBLEWOOD DR
SIX SPOONS RD
SIX KNIVES RD
STRATFORD CT
Western Tributary
MAY CT
LASSITER MILL RD
ROLSTON DR
SIX FORKS RD
N
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

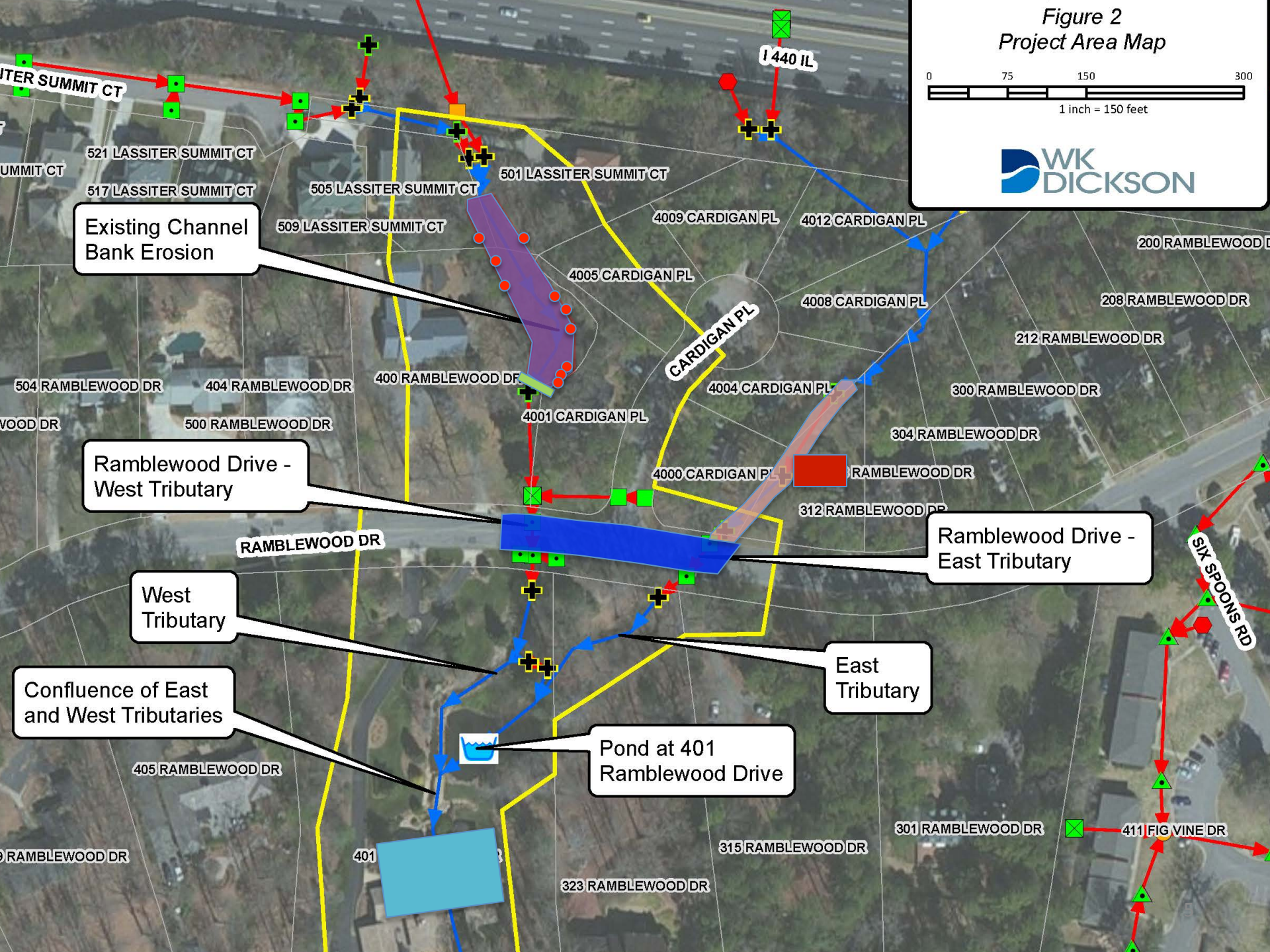
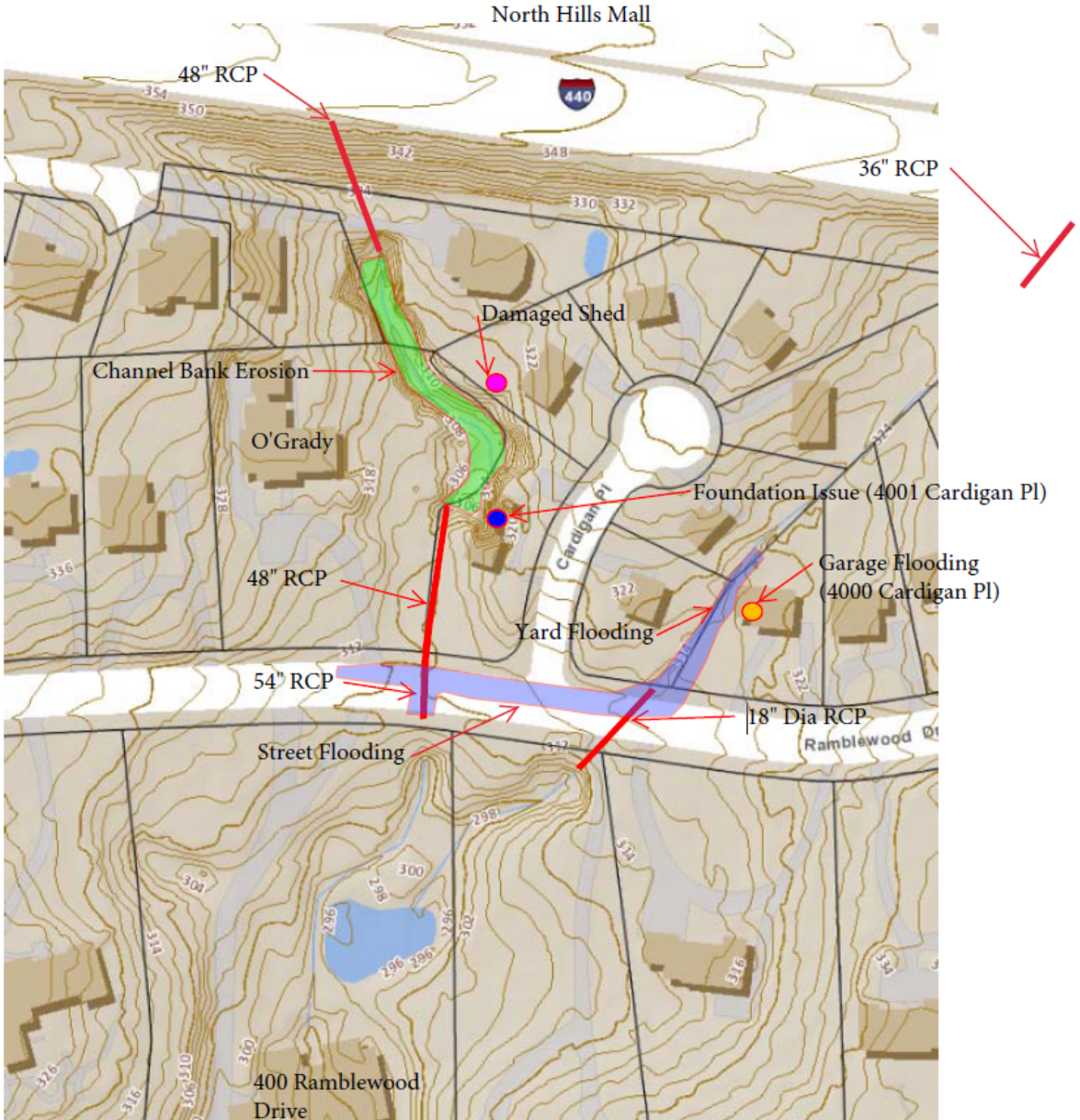


Figure 2
Project Area Map
0
75
150
300
1 inch = 150 feet
WK DICKSON
Existing Channel Bank Erosion
Ramblewood Drive - West Tributary
Ramblewood Drive - East Tributary
West Tributary
East Tributary
Confluence of East and West Tributaries
Pond at 401 Ramblewood Drive
I 440 IL
521 LASSITER SUMMIT CT
517 LASSITER SUMMIT CT
505 LASSITER SUMMIT CT
501 LASSITER SUMMIT CT
509 LASSITER SUMMIT CT
4009 CARDIGAN PL
4012 CARDIGAN PL
4005 CARDIGAN PL
4008 CARDIGAN PL
CARDIGAN PL
4004 CARDIGAN PL
4001 CARDIGAN PL
4000 CARDIGAN PL
200 RAMBLEWOOD
208 RAMBLEWOOD DR
212 RAMBLEWOOD DR
300 RAMBLEWOOD DR
304 RAMBLEWOOD DR
312 RAMBLEWOOD DR
504 RAMBLEWOOD DR
404 RAMBLEWOOD DR
400 RAMBLEWOOD DR
500 RAMBLEWOOD DR
RAMBLEWOOD DR
405 RAMBLEWOOD DR
401
315 RAMBLEWOOD DR
323 RAMBLEWOOD DR
301 RAMBLEWOOD DR
411 FIG VINE DR
SIX SPOONS RD

Map of Existing Drainage Issues



Project Goals

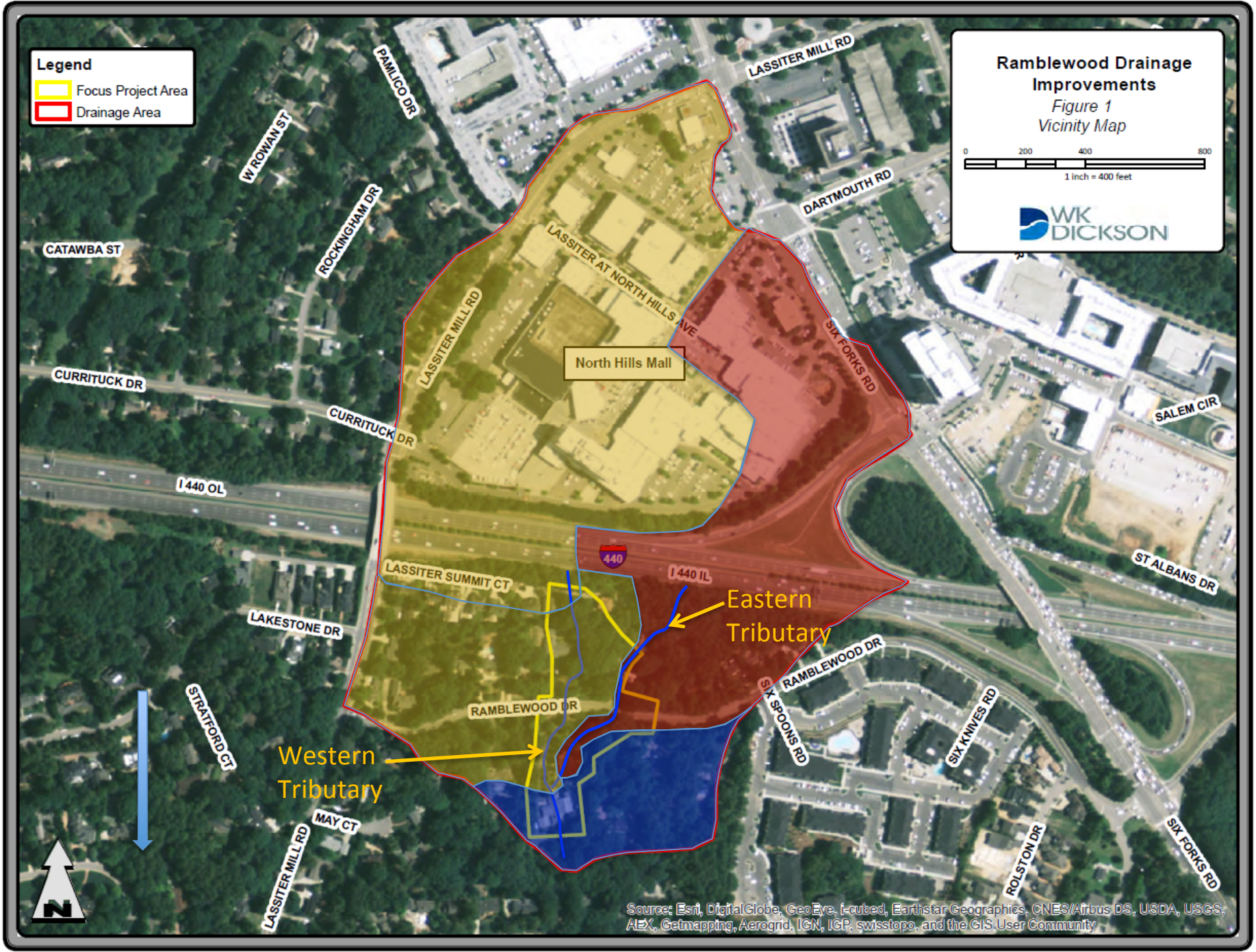
Minimize roadway flooding – Target 10-year storm event

Minimize garage & crawl space flooding of home along the east tributary – 10-year flood event

Stabilize banks of west tributary

No adverse impacts downstream of Ramblewood (under home and at pond)

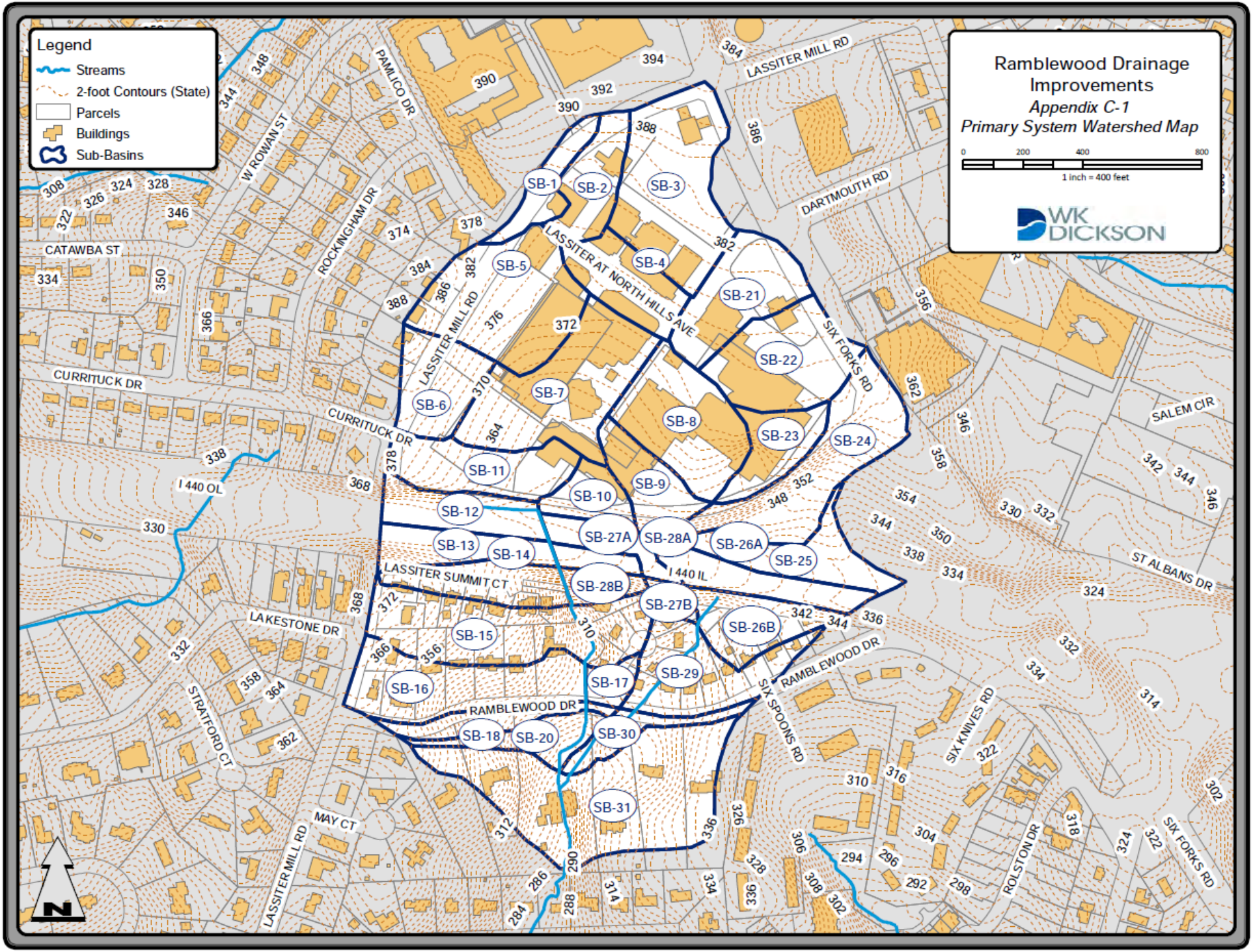
Upstream of Ramblewood Drive - Eastern Tributary


Legend
Focus Project Area
Drainage Area
Ramblewood Drainage Improvements
Figure 1
Vicinity Map
0 200 400 800
1 inch = 400 feet
WK DICKSON
LASSITER MILL RD
PAMLICO DR
W ROWAN ST
ROCKINGHAM DR
CATAWBA ST
DARTMOUTH RD
LASSITER AT NORTH HILLS AVE
LASSITER MILL RD
North Hills Mall
SIX FORKS RD
CURRITUCK DR
CURRITUCK DR
I 440 OL
SALEM CIR
ST ALBANS DR
440
I 440 IL
LASSITER SUMMIT CT
Eastern Tributary
LAKESTONE DR
RAMBLEWOOD DR
RAMBLEWOOD DR
SIX SPOONS RD
SIX KNIVES RD
STRATFORD CT
Western Tributary
MAY CT
LASSITER MILL RD
ROLSTON DR
SIX FORKS RD
N
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Modeling Methodology

- Discuss Modeling Options
  - Steady State
  - Dynamic Wave

- Utilized EPA SWMM
  - Dynamic wave equation-based hydraulic models are important to use when:
    - Portions of systems have flat slopes
    - Model results need to account for backwater effects
    - Transitions between closed system and open channel analysis flow is needed
    - Model results need to account for Storage/Sump areas


Legend
Streams
2-foot Contours (State)
Parcels
Buildings
Sub-Basins
Ramblewood Drainage Improvements
Appendix C-1
Primary System Watershed Map
0 200 400 800
1 inch = 400 feet
WK DICKSON
SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
SB-8
SB-9
SB-10
SB-11
SB-12
SB-13
SB-14
SB-15
SB-16
SB-17
SB-18
SB-20
SB-21
SB-22
SB-23
SB-24
SB-25
SB-26A
SB-26B
SB-27A
SB-27B
SB-28A
SB-28B
SB-29
SB-30
SB-31
LASSITER MILL RD
LASSITER AT NORTH HILLS AVE
DARTMOUTH RD
SIX FORKS RD
CURRITUCK DR
CATAWBA ST
W ROWAN ST
PAMLICO DR
ROCKINGHAM DR
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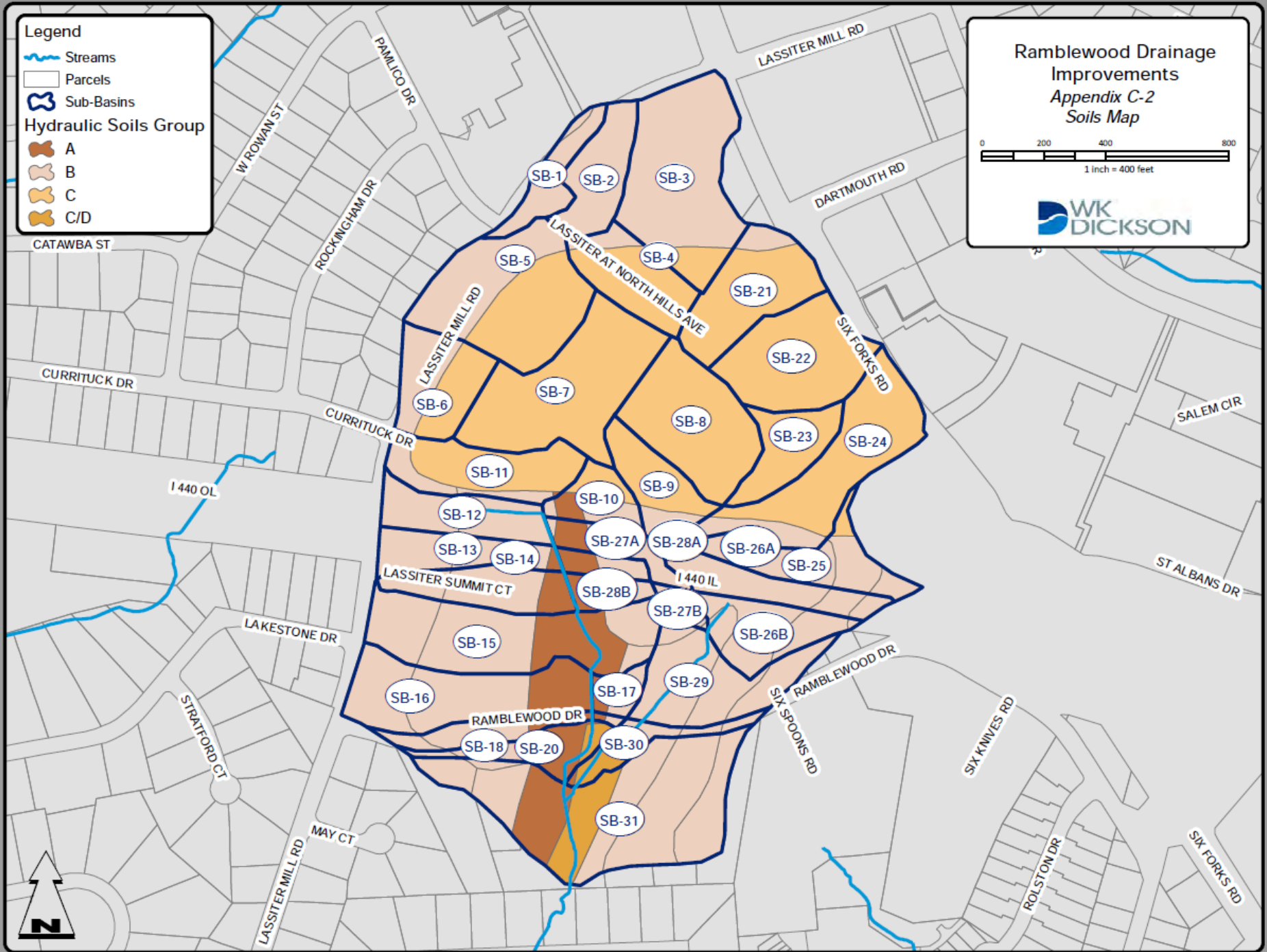
SIX KNIVES RD
ROLSTON DR
SALEM CIR
ST ALBANS DR


Legend
Streams
Parcels
Sub-Basins
Hydraulic Soils Group
A
B
C
C/D
Ramblewood Drainage Improvements
Appendix C-2
Soils Map
0
200
400
800
1 inch = 400 feet
WK DICKSON
LASSITER MILL RD
PAMLICO DR
W ROWAN ST
ROCKINGHAM DR
DARTMOUTH RD
CATAWBA ST
LASSITER AT NORTH HILLS AVE
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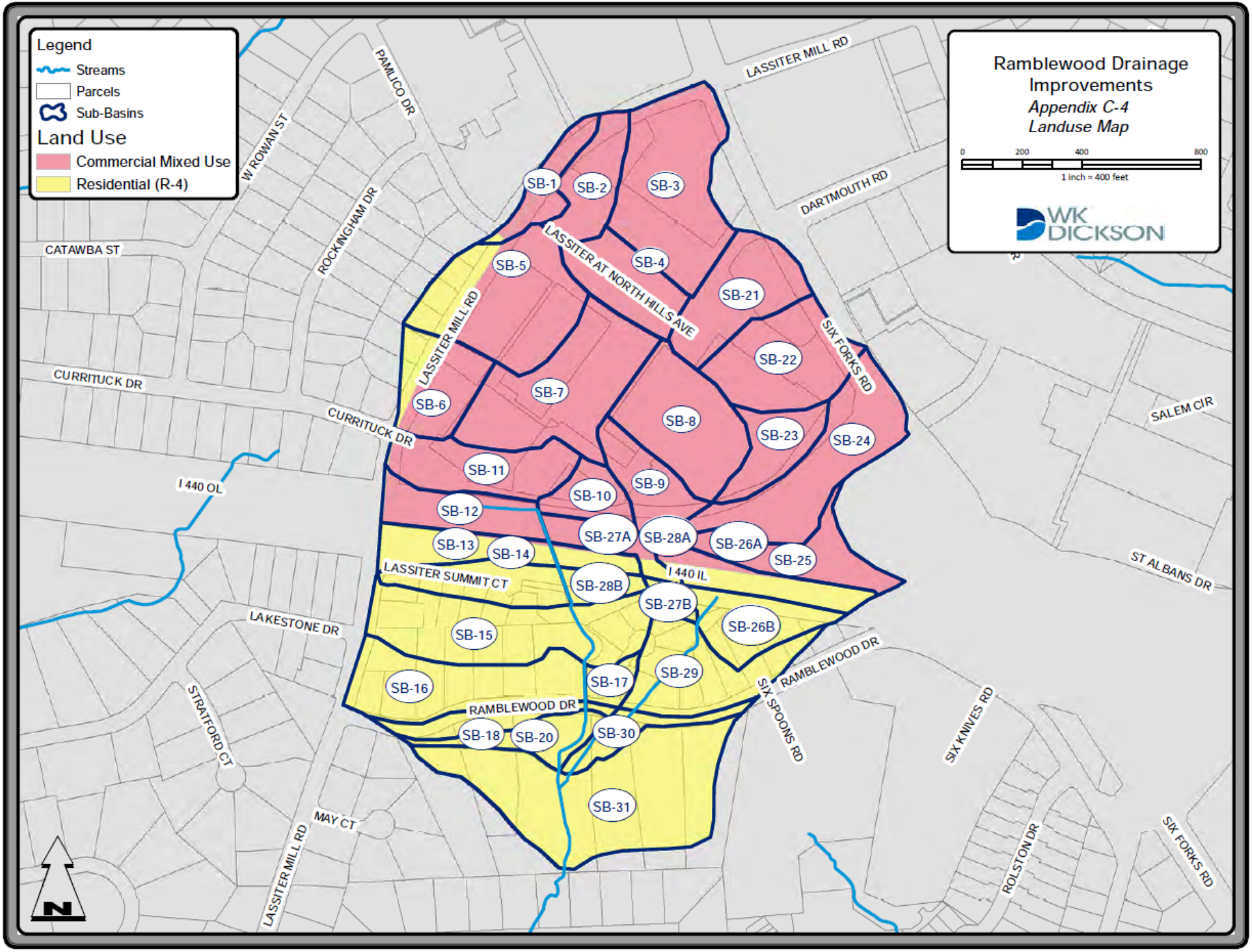
SB-31


Legend
Streams
Parcels
Sub-Basins
Land Use
Commercial Mixed Use
Residential (R-4)
Ramblewood Drainage Improvements
Appendix C-4
Landuse Map
0
200
400
800
1 inch = 400 feet
WK DICKSON
LASSITER MILL RD
PAMLICO DR
W ROWAN ST
ROCKINGHAM DR
DARTMOUTH RD
CATAWBA ST
LASSITER AT NORTH HILLS AVE
SIX FORKS RD
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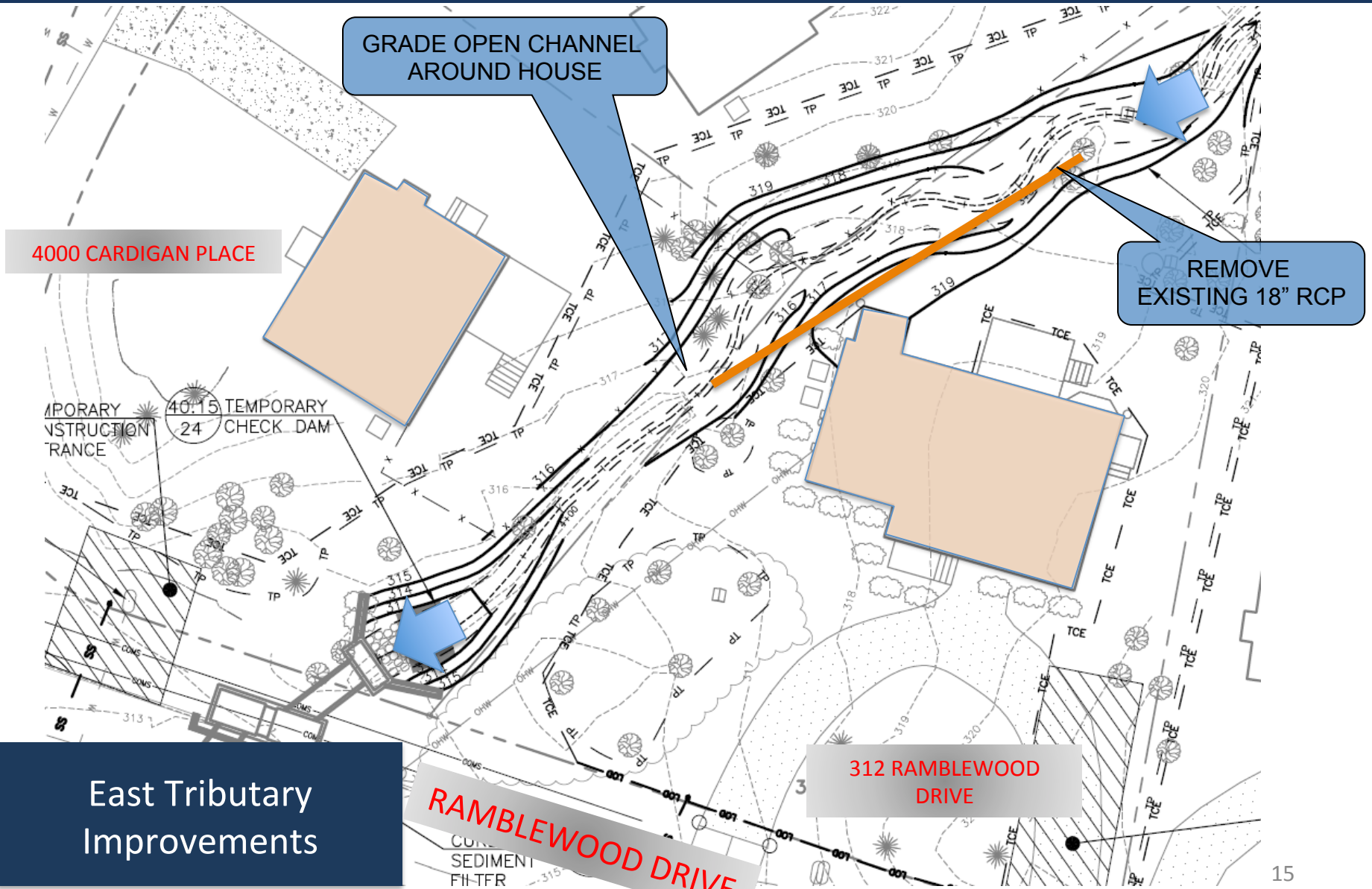
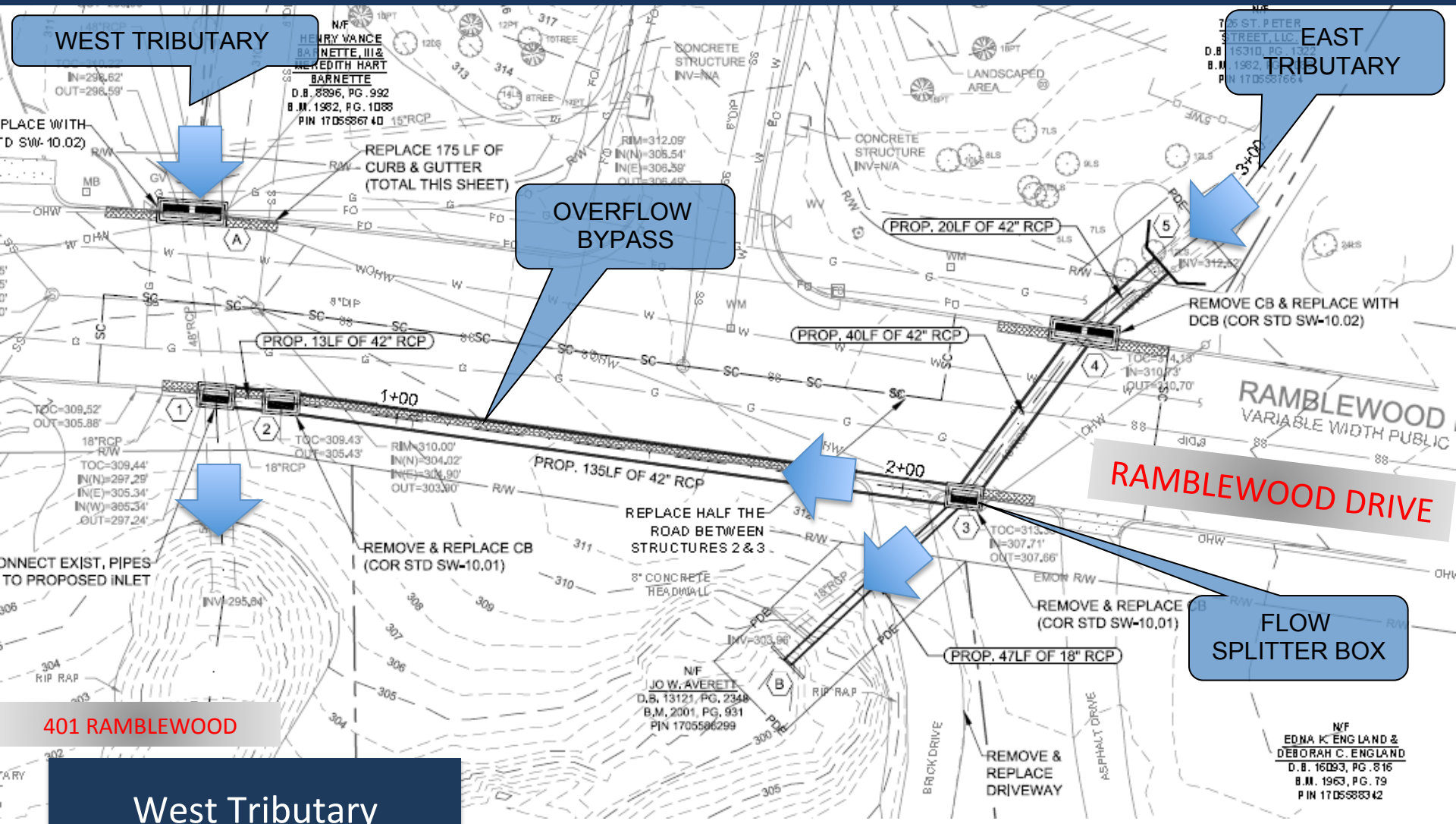
SB-30
SB-31
N

SWMM Model

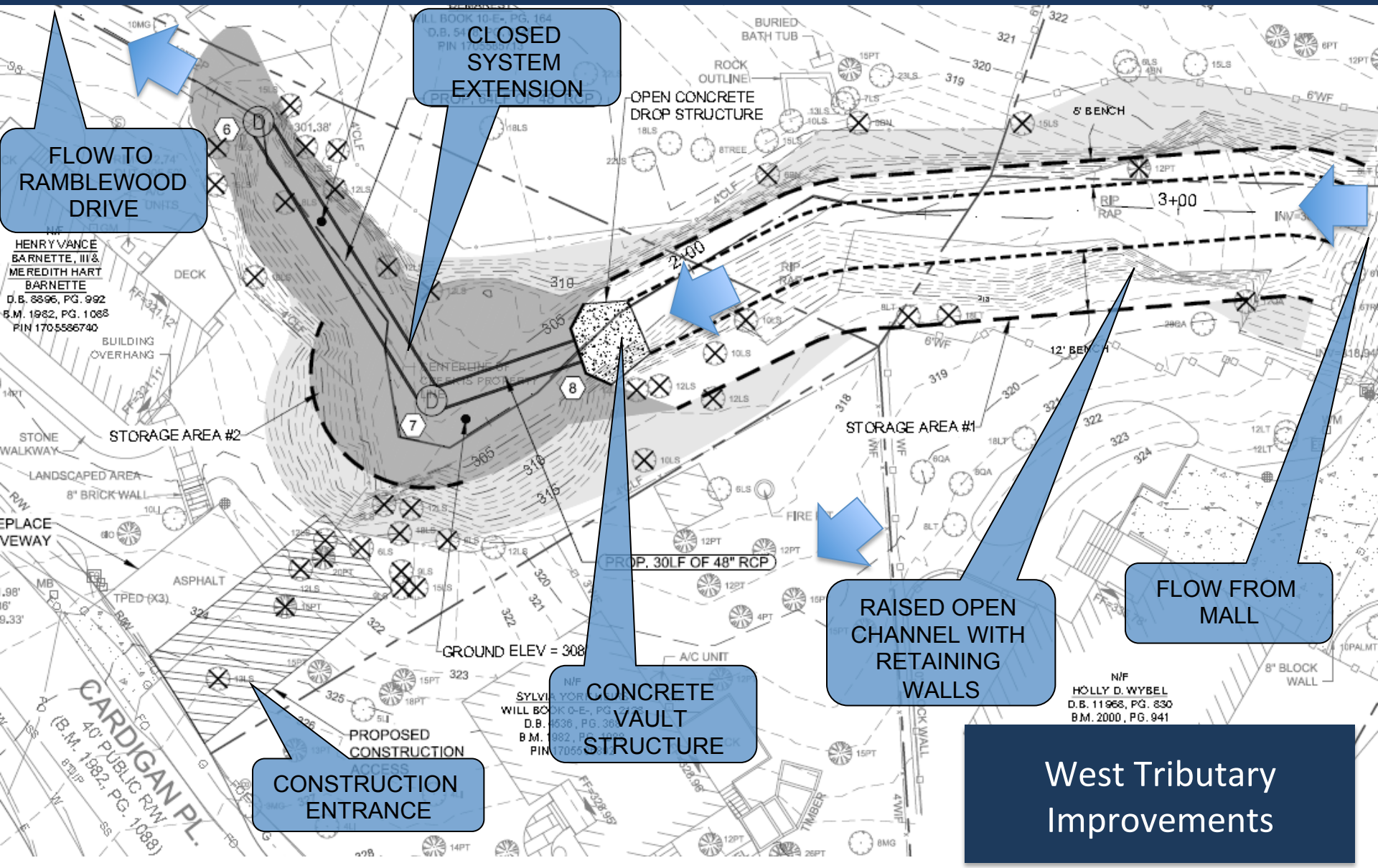
Recommended Improvements



Recommended Improvements

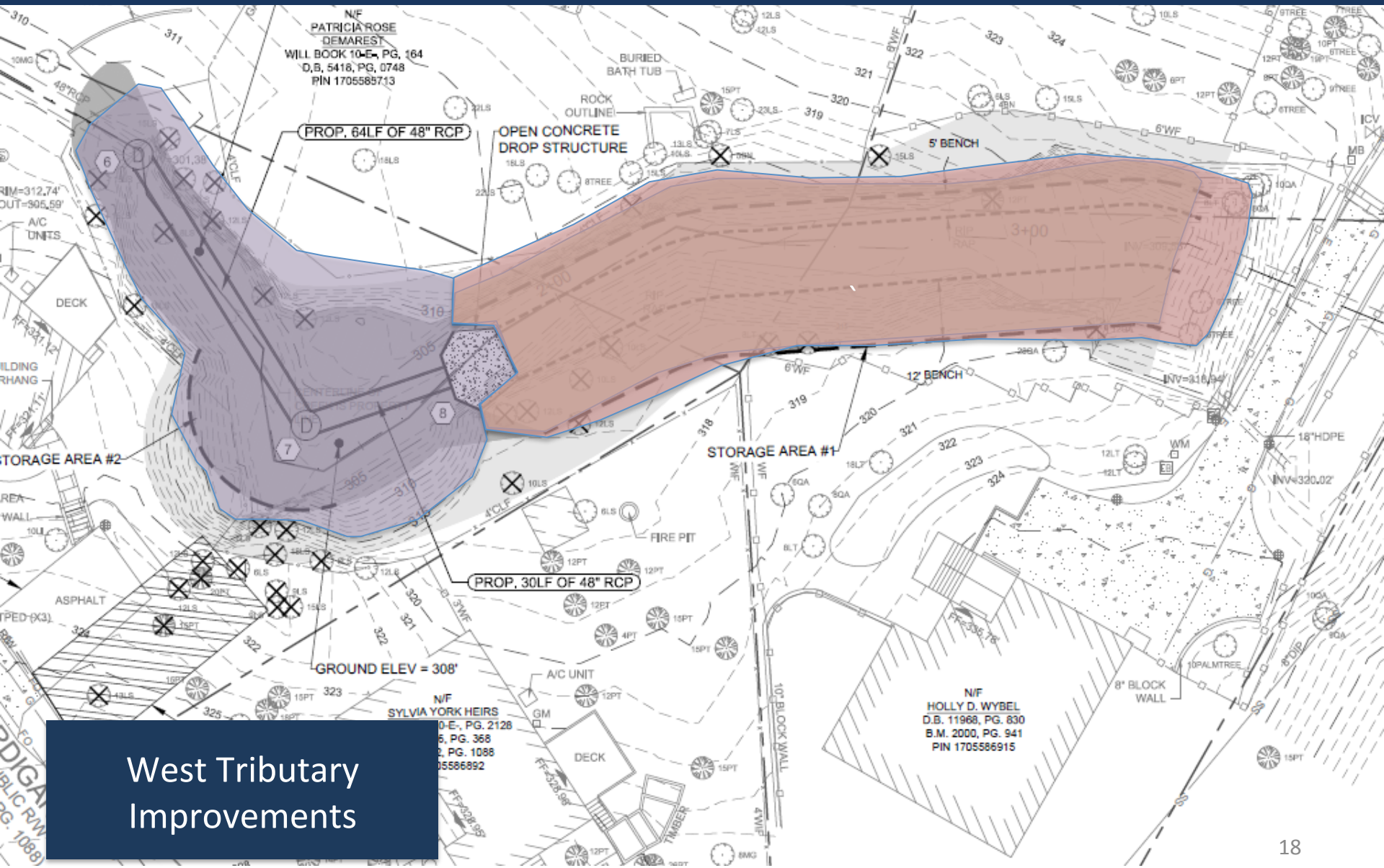


Recommended Improvements



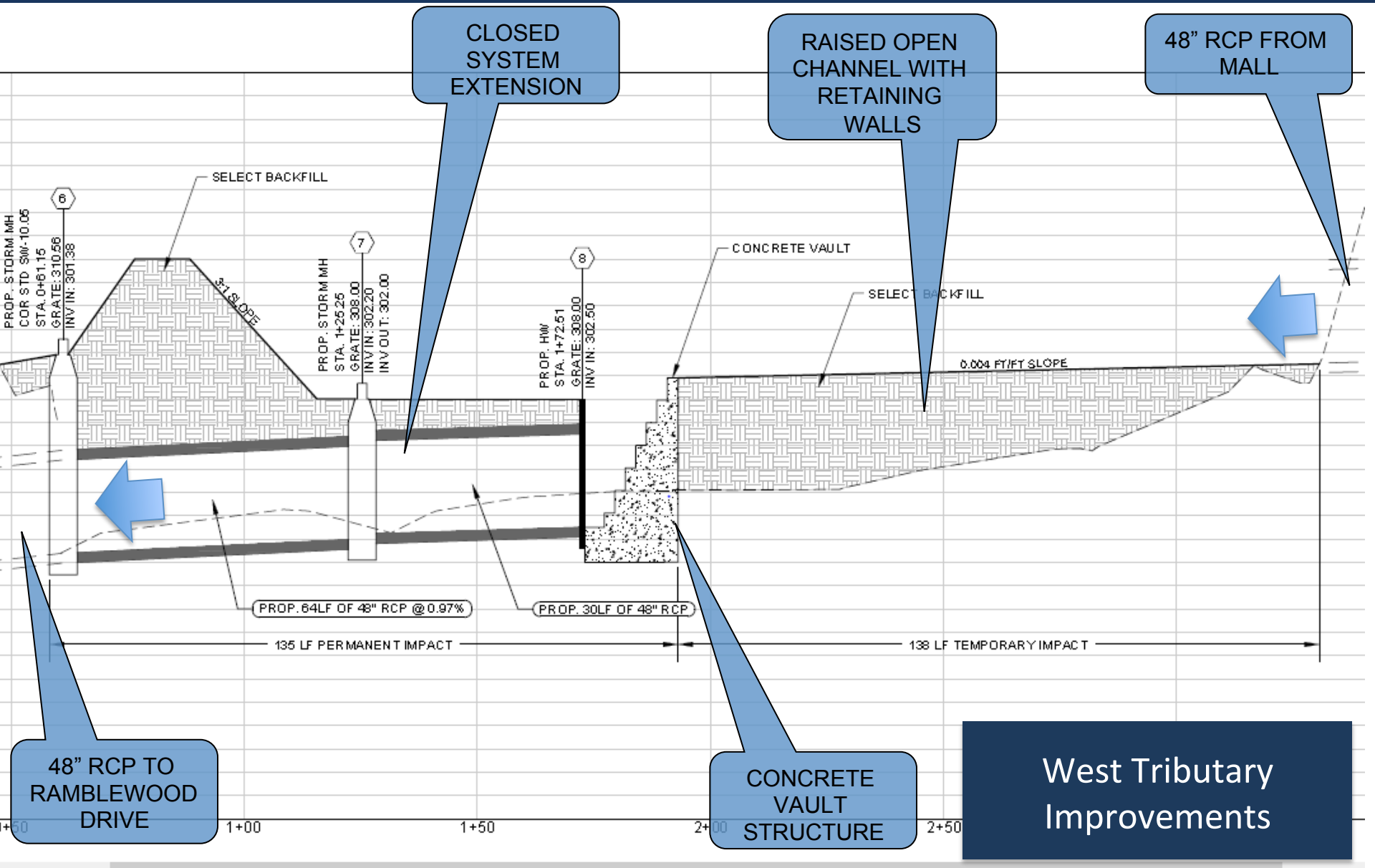
West Tributary Improvements

Recommended Improvements



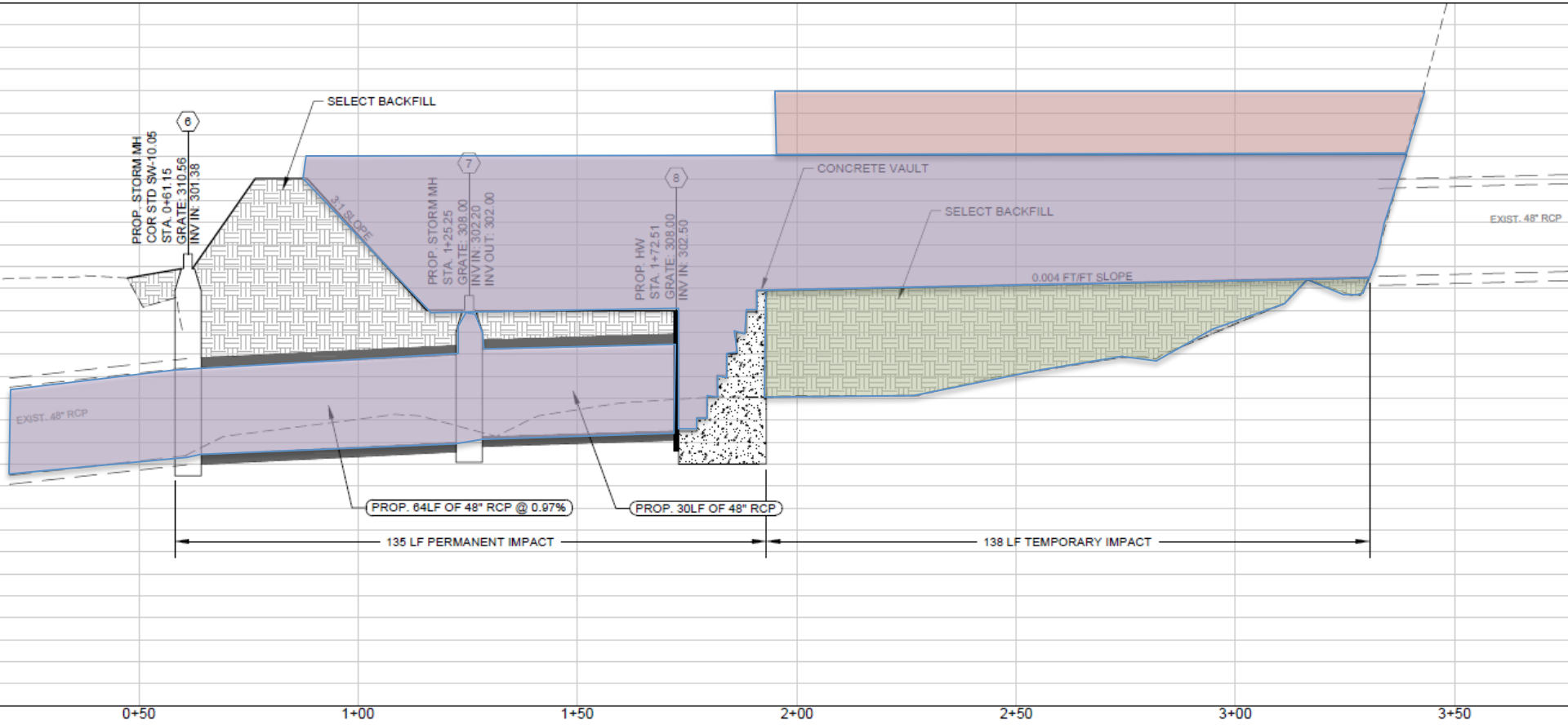
West Tributary Improvements

Recommended Improvements



West Tributary Improvements

Recommended Improvements



WESTERN TRIB PROFILE

West Tributary Improvements

Model Results @ West Tributary – Flooding

Model Results @ West Tributary – Channel Stability

Model Results @ 401 Ramblewood Drive – Peak Flows

Table H-2: Flows Under Home at 401 Ramblewood Drive – Existing Conditions

2-Year Peak Flow (cfs)	10-Year Peak Flow (cfs)	25-Year Peak Flow (cfs)	50-Year Peak Flow (cfs)	100-Year Peak Flow (cfs)	Flow Capacity (cfs)
145.0	217.9	270.2	308.7	352.5	439.1

Table H-4: Flows Under Home at 401 Ramblewood Drive – Proposed Conditions

2-Year Peak Flow (cfs)	10-Year Peak Flow (cfs)	25-Year Peak Flow (cfs)	50-Year Peak Flow (cfs)	100-Year Peak Flow (cfs)
145.0	221.8	269.1	291.8	351.5

Ex. 500-Yr Peak Flow (cfs)	Prop. 500-Yr Peak Flow (cfs)	Change (cfs)
427.3	423.7	3.6

Model Results @ 401 Ramblewood Drive – WSELs

Table H-3: Water Surface Elevation at 401 Ramblewood Drive – Existing Conditions

Location	Calculated Water Surface Elevation (feet NAVD)				
	2-year storm	10-year storm	25-year storm	50-year storm	100-year storm
401 Ramblewood Drive – Low Chord (Elevation = 292.4′)	289.59	290.55	291.16	291.52	291.84

Table H-5: Water Surface Elevation at 401 Ramblewood Drive – Proposed Conditions

Location	Calculated Water Surface Elevation (feet NAVD)				
	2-year storm	10-year storm	25-year storm	50-year storm	100-year storm
401 Ramblewood Drive – Low Chord (Elevation = 292.4′)	289.59	290.59	291.14	291.36	291.81

Schedule

Task	Date
Complete 30% Design Plans	May 2017
Conduct Initial Public Meeting	June 2017
Complete 70% Design Plans	September 2017
Secure Environmental Permits + Easement Acquisition	Jan 2018
Finalize Design Plans	June 2018
Relocate Private Utilities	Nov 2017 – April 2018
Send Out to Bid	August 2018
Begin Construction	August 2018

Questions?

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Direct Line: 919-996-4074
E-mail: David.Kiker@raleighnc.gov

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